

**WHAT IS CLAIMED IS:**

1. A vehicle alignment measurement apparatus, said vehicle including a trailer having a kingpin for removably connecting said trailer to a tractor and a plurality of wheels mounted on at least one axle suspended from said trailer, said vehicle alignment measurement apparatus comprising:

a first reference member removably mountable on said kingpin of said trailer; and

a wheel extender assembly removably mountable on selected ones of said wheels, said extender assembly having a second reference member alignable with a centerline of said axle on which the selected wheel is mounted, whereby a distance between said first reference member and said second reference member is measurable to determine the alignment of said axle relative to said kingpin.

2. The vehicle alignment measurement apparatus of claim 1, wherein the wheel extender assembly includes:

a plurality of alignment bars that are spaced about said centerline of said axle on which said selected wheel is mounted, and the bars extend parallel to said centerline, wherein each alignment bar engages a selected stud of said selected wheel;

a cylindrical wheel extender slidably disposed between the spaced alignment bars, including an inboard end and an outboard end, wherein the inboard end contacts a surface of said selected wheel;

a center bar operatively connected to and extending from the outboard end of the wheel extender approximately along said centerline, and including a distal end;

a securing plate defining orifices that receive the alignment bars and the center bar, allowing the plate to operatively contact the outboard end of the wheel extender;

means to secure the securing plate in operative contact with the outboard end of the wheel extender; and

said second reference member mounted on the distal end of the center bar.

3. The vehicle alignment measurement apparatus of claim 2, wherein at least one leg is formed on said wheel extender at said inboard end and said leg includes a step, whereby said step engages an inner diameter of said selected wheel.

4. The vehicle alignment measurement apparatus of claim 1, further comprising at least two of said wheel extender assemblies, wherein each of said wheel extender assemblies is removably mountable on a separate respective selected wheel of said vehicle.

5. The vehicle alignment measurement apparatus of claim 4, wherein said wheel extender assemblies are connected to separate respective wheels that are mounted on the same axle of the vehicle.

6. The vehicle alignment measurement apparatus of claim 4, wherein said wheel extender assemblies are connected to separate respective wheels that are mounted on different axles of the vehicle.

7. The vehicle alignment measurement apparatus of claim 1, wherein the first reference member includes an adapter plate.

8. The vehicle alignment measurement apparatus of claim 1, wherein said distance is measured with a tape extensometer.

9. A vehicle alignment measurement apparatus, said vehicle including a trailer having a pair of spaced-apart, parallel, longitudinally-extending frame rails connected to a bottom of said trailer, and further including a kingpin for removably connecting said trailer to a tractor, said vehicle alignment measurement apparatus comprising:

a first reference member removably mountable on said kingpin of said trailer; and

a rail extender assembly removably mountable on selected ones of said frame rails, said extender assembly having a second reference member disposed perpendicular to said selected rail, whereby a distance between said first reference member and said second reference member is measurable to determine the alignment of said frame rail relative to said kingpin.

10. The vehicle alignment measurement apparatus of claim 9, wherein the rail extender assembly includes:

a base having a diameter which is larger than a diameter of selected ones of orifices formed in said frame rails;

a shaft extending axially from the base;

said second reference member disposed on an end of the shaft opposite the base;  
and

a positioning member that includes a tapered outer surface which engages a  
selected one of said frame rail orifices, and defines a central bore that receives the shaft,  
5 whereby said second reference member is centered relative to the selected one of said frame rail  
orifices.

11. The vehicle alignment measurement apparatus of claim 10, wherein a first  
one of said selected frame rail orifices is formed in a curb side frame rail, and wherein a second  
10 one of said selected frame rail orifices is formed in a driver's side frame rail and is transversely  
aligned with the first one of said selected frame rail orifices.

12. The vehicle alignment measurement apparatus of claim 11, further  
comprising two of said rail extender assemblies, and wherein the first of two said rail extender  
15 assemblies is mountable in said first one of said selected frame rail orifices and the second of  
two said rail extender assemblies is mountable in said second one of said selected frame rail  
orifices.

13. The vehicle alignment measurement apparatus of claim 9, wherein the  
20 first reference member includes an adapter plate.

14. The vehicle alignment measurement apparatus of claim 9, wherein said  
distances are measured with a tape extensometer.

25 15. A vehicle alignment measurement apparatus, said vehicle including a  
trailer having a pair of spaced-apart, parallel, longitudinally-extending frame rails connected to a  
bottom of said trailer, a kingpin for removably connecting said trailer to a tractor, and a plurality  
of wheels mounted on at least one axle suspended from said trailer, said vehicle alignment  
measurement apparatus comprising:

30 a first reference member removably mountable on said kingpin of said trailer;  
a second reference member removably mountable on selected ones of said frame  
rails, said second reference member being disposed perpendicular to said selected rail; and  
a third reference member removably mountable on selected ones of said wheels,  
said third reference member being alignable with a centerline of said axle on which the selected

wheel is mounted, whereby a distance between said first reference member and said second reference member is measurable to determine the alignment of said frame rail relative to said kingpin, and a distance between said first reference member and said third reference member is measurable to determine the alignment of said axle relative to said kingpin.

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16. A method for measuring the alignment of a vehicle, said vehicle including a trailer having a kingpin for removably connecting said trailer to a tractor and a plurality of wheels mounted on at least one axle suspended from said trailer, said method comprising the steps of :

10                   removably mounting a first reference member on said kingpin of said trailer;  
                      selecting a wheel;  
                      removably mounting a wheel extender assembly on the selected wheel, said  
extender assembly having a second reference member alignable with a centerline of said axle on  
which the selected wheel is mounted; and  
15                   measuring a distance between said first reference member and said second  
reference member to determine the alignment of said axle relative to said kingpin.

17. The method of claim 16, wherein the step of measuring includes  
measuring said distance with a tape extensometer.

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18. A method for measuring the alignment of a vehicle, said vehicle including a trailer having a pair of spaced-apart, parallel, longitudinally-extending frame rails connected to a bottom of said trailer, and further including a kingpin for removably connecting said trailer to a tractor, said method including the steps of:

25                   removably mounting a first reference member on said kingpin of said trailer;  
                      selecting a frame rail;  
                      removably mounting a rail extender assembly on the selected rail, said extender  
assembly having a second reference member disposed perpendicular to said selected rail; and  
                      measuring a distance between said first reference member and said second  
30 reference member to determine the alignment of said frame rail relative to said kingpin.

19. The method of claim 18, wherein the step of measuring includes  
measuring said distance with a tape extensometer.

20. A method for measuring the alignment of a vehicle, said vehicle including a trailer having a plurality of wheels mounted on at least a pair of axles suspended from said trailer, said method comprising the steps of :

selecting a wheel mounted on a front axle of said vehicle;

5 removably mounting a first wheel extender assembly on the selected wheel mounted on the front axle of the vehicle, said first wheel extender assembly having a first reference member alignable with a centerline of said front axle;

selecting a wheel mounted on a rear axle of said vehicle;

10 removably mounting a second wheel extender assembly on the selected wheel mounted on the rear axle of the vehicle, said second wheel extender assembly having a second reference member alignable with a centerline of said rear axle; and

measuring a distance between said first reference member and said second reference member to determine the alignment of one of said front and rear axles relative to the other of said front and rear axles.

15 21. A method of measuring the alignment of a vehicle, said vehicle including a trailer having a pair of spaced-apart, parallel, longitudinally-extending frame rails connected to a bottom of said trailer, a kingpin for removably connecting said trailer to a tractor and a plurality of wheels mounted on at least one axle suspended from said trailer, said method comprising the steps of:

removably mounting a first reference member on said kingpin of said trailer;

selecting a frame rail;

removably mounting a second reference member on said selected frame rail perpendicular to said selected rail;

25 selecting a wheel;

removably mounting a third reference member on said selected wheel alignable with a centerline of said axle on which the selected wheel is mounted;

measuring a distance between said first reference member and said second reference member to determine the alignment of said frame rail relative to said kingpin; and

30 measuring a distance between said first reference member and said third reference member to determine the alignment of said axle relative to said kingpin.

22. The method of claim 21, wherein the step of removably mounting said second reference member includes providing a rail extender assembly.

23. The method of claim 21, wherein the step of removably mounting said third reference member includes providing a wheel extender assembly.